Implementation of Collage Grammar in Kolam Grammar to Generate Kolam Patterns in Picture Languages

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Abstract*: *Collages contains pin points in addition to colour parts. This grammar works on pictures itself, we state that collage picture grammar is picture on picture. We add picture into the pictures. Kolam grammar has been generated using 'n' number of rules and it can be used on collage picture grammar. The rules are used to generate the kolam pattern and then collage pictures can generate.

Index Terms*: *Formal Languages, Picture Languages, Kolam Grammar, Collage Grammar

I. INTRODUCTION

Graphic fine art made up of a creative work of art signified by the relevant to paints. Picture value a million words. Therefore there is huge importance to generate pictures with computer. As a result it is not surprising that a bundle of all picture generating devices be established. Many researchers have done work on collage grammar and kolam picture grammar. Here we proposed a technique in which we use collage grammar on kolam grammar. It gives new generative patterns to kolam pattern. Few researchers have done research on graph grammar and the applying a collage concept. They started with graph grammars where all the edges are substituted with a graph. For this substitution they used some set of rules along with the necessary information for replacing. . If in case we replace just an edge then we should have two nodes for the graph where it substitutes the edge. These can be recognized with the all nodes of replaced edges. The rules are in the form of non terminals(N) in the left side and two nodes will be in the right hand side, that is a graph. The rule is G=(V,E)where it may contain labelled edge or unlabelled edge and it has two nodes which both should be distinguished nodes. A graph named as H1=(V1,E1)and it will be converted to H2=(V2,E2).From this the language can be generated by graph grammar where it consist of graphs with unlabelled edges only. It is achieved by applying derivation steps. Herecontext free collage grammar is defined which is undecidable.It can generate a easy curve, closed easy curve, regular picture, Eulerian and Hamiltonian picture, tree[1]. In this paper we proposed an idea to apply collage grammar on kolam grammar. We present four sections in this paper.

We explained about kolam grammar in Section-1,collage grammar in section 2,collage grammar in kolam grammar in section 3 and some results on collage grammar in section 4.

II. KOLAM GRAMMAR

An olden and still accepted South Indian drawing art form is kolam. The challenging type of kolam is called the pulli(dot) kolam, described in Tamil, which contain series of dots pulli) placed on a plane following some rules.

In[6] kolam is square tiles and it is not defined as alphabets. Here they described the alphabet contains some subsequent rule set. For example,R1C1l-R2C1s-R3C2r is called as an alphabet. The point we begin applying our rule is indicated as R1C1 where R denotes row, and C denotes column) i.e. it is gives the information as row number 1 with column number 1.Figure-1 depicts the some rules which are used generate the kolam patterns[3].

A. Collage Grammar In Kolam Grammar

Collage grammars allow one to derive collages from collages, that is, they work directly on pictorial objects rather than on representations of some kind that need an extra pictorial interpretation. The derivation process of collage grammars employs the concept of hyperedge replacement which stems from the field of graph grammars. Hence, the study of collage grammars can be seen as an attempt to carry over some experience in graph grammar theory to computer graphics.

A kolam grammar is a 8 tuple, Grammar $G = (P,T,I,O, \Sigma,A,C,CS)$,Table-1 gives the tuples details.

After apply the algorithm we can generate the many kolam patterns. One example we shown here to apply the collage grammar in generated kolam patterns[3].
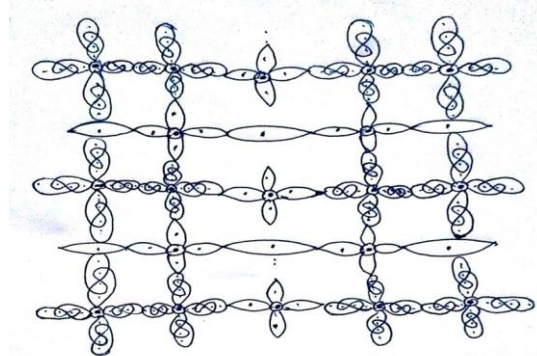

Figure.2 Final Kolam Pattern

Table.1 Tuple in Kolam Grammar

P	finite number of places	starts with p_1 till px where x > 1
T	finite number of transitions	starts with t1 till tm where m >1 and , P∩T= Null
I	input function in the transition	the finite number of places, T→P
O	output function in the transition	the finite number of places, T→P
A	Axiom is used to manipulate kolam using collages	centred axiom in a square tile.
C	square tile, axiom is centred	implies Left context, Right context, Upper context, Down context around an axiom A and C
CS	Collage Symbol	axiom A and context C. A∪C = CS.

A. Generating Kolam Picture Language

They used the following algorithm to define the kolam picture grammar and then we can generate collage picture grammar by using the same rules and same .

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ALGORITHM

Problem : Generating a kolam using kolam grammar rules

Inputs : All finite set of rules which includes set of dots.

Outputs : Finite set of kolam patterns.

```
        Start=>D|C
        1.Rules()
        Add(D|C) [optional]
        If(cd){multiple() }
        =>multiple(complete)||move()||multiple(current_design)||stop()
    multiple(current_design)
    {
      Update and store=recent;
      If(cd)=>add(current_design,recent) endif
      n=repeat(n,the way)=>optional
      Update and store=complete;
      m=repeat(4,9)=>optional
      Update and store=complete;
        =>multiple(complete)||move()||multiple(current_design)||stop()
    }
    multiple(complete)
    {
      Update and store=complete;
    m=repeat(4,9)
    Update and store=complete;
    =>multiple(complete)||move()||multiple(current_design)||stop()
    }
If(stop())
{
If(order==(n,n))
stop
endif
 endif
}
```

III. COLLAGE GRAMMAR

A collage consists of parts in addition to a series of pin-points. A "*part*" could be an arbitrary set of point which is denoted in an Euclidean space. Generally, parts are occupied from various standard set of arithmetic objects. polygons, circles, triangles, polyhedra can be used. It has easy finite description and are simple to treat through graphical surfaces. Application of this parts and upcoming study parts might also obtain colours and textures. The pin-points should be added for technical cause[4,5]. These pin points are used to attach collages into collages. To generate collages on collages, we apply application of production rules, they are highlighted with hyperedges in intermediary steps. A hyperedge is a labelled point with attached point.

To describe hyperedge replacement properly, they use three co and constructions on the decorated collages. Those constructions are hyperedge removal, addition and transformation. Using this hyperedge replacement technique, we can derive collages from collages, especially decorated collages by applying productions.

2.1 Definition A collage grammar is defined as *CG = (N,P,Z)* where *N* is a finite set of non terminals, *P* is defined as a finite set of productions over *N* along with finite right-side and *Z* is under "*C(N")* is a finite (decorated) collage, then it is called as axiom.

Some examples to illustrate the collage grammar in carpet has been shown here.It is defined as *carpet=(C,{p1,p2},Z).*

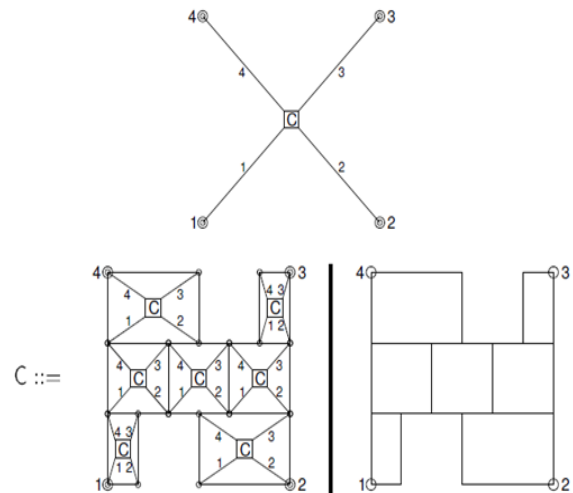
Figure.3 Axioms and productions in carpet.

IV. COLLAGES IN KOLAM GRAMMAR

We can generate new patterns in kolam grammar and then we can apply the rules to have a collage patterns on kolam grammars by applying rules on rules. In this paper we apply only limited rules for generating kolam with collage. The following are sample kolam patterns where we can apply collage pattern and we can get many patterns.

V. RESULTS ON COLLAGE GRAMMAR

An imposing this an a condition,
When (match("/F11F11/")) // position
{
Split (px(F11),0.5,0.5,px(F11))
Replace (0.5→NULL)
Insert(sc→NULL)
}

Finally we can get a result if apply the rules for kolam pattern to generate a new patterns. Here we drawn the collage pattern and gives a new result.
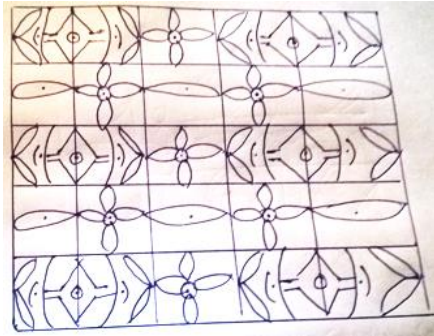

Figure.5 Collage on Kolam Grammar

VI. CONCLUSION

Picture language is one of the interesting area to depict most of the theorems in formal languages. In this paper we considered kolam paper as a heart of the work. From that we extended our work to collage grammar to get better result and increase the kolam patterns also.

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